RESUMO SIMPLES - ECTOPARASITOS: SISTEMÁTICA, EPIDEMIOLOGIA E CONTROLE

NEW APPROACHES IN THE DEVELOPMENT OF ORAL VETERINARY FORMULATIONS THROUGH 3D PRINTING WITH EMPHASIS ON THE BRAZILIAN PET MARKET

Gabrielle De Lima Monzato (monzatogabrielle@gmail.com)

Diefrey Ribeiro Campos (diefrey8@gmail.com)

Giovanna Pereira Do Valle Santos (giovannadovalle@ufrrj.br)

Ana Bárbara De Souza Moura (smanabarbara@gmail.com)

Vitoria Regina Oliveira De Jesus Soares (vitoriaolivr@ufrrj.br)

Mathias Pittizer Da Silva (pittizer@ufrrj.br)

Matheus Eduardo Costa Da Silva (matheuseduardodix@outlook.com)

Ingrid Lins Raquel De Jesus (raquellingrid@gmail.com)

Taynara Monsores E Silva (taynaramonsores@ufrrj.br)

Yara Peluso Cid (yarapcid@gmail.com)

The veterinary industry has shown significant growth due to the increasing adoption of companion animals, with an estimated 845 million dogs and cats currently living in households worldwide. This scenario reflects the growing attention of pet owners in prioritizing animal health. One of the most recurrent concerns is the control of ectoparasites. In this context, for domesticated felines, the flea Ctenocephalides felis felis stands out due to its association with

the transmission of pathogenic agents and allergic dermatitis. Currently, several medications are available in different pharmaceutical forms; however, administration difficulties may impair treatment adherence and, consequently, therapeutic effectiveness. The use of 3D printing by semi-solid extrusion (SSE) enables the fabrication of pharmaceutical dosage forms focused on dose personalization, shape customization, and improved palatability tailored to the specific needs of cats. The aim of this study was to develop and physicochemically characterize chewable oral formulations using 3D extrusion printing technology, with the future perspective of incorporating fipronil. A total of ten base formulations in hydrogel form were prepared from the hydration of polymers, diluents, binders, thickeners, and humectants in varying proportions. These formulations were evaluated through different assays: the bridge overlap test, to verify the structural resistance of the polymeric network; the inverted tube test, to assess the ability to maintain shape under gravity; the 3D printing test, to analyze extrusion characteristics and printed structure formation considering parameters such as nozzle diameter, layer height, speed, and extrusion flow; and the equilibrium isotherm test for determining dry mass, used to assess the impact of moisture removal on structural stability, shape retention, and printed consistency. Through the applied assays, it was possible to characterize the behavior of the base formulations and determine the most suitable one. The results demonstrated that among all formulations, F10 presented the most promising printing profile, with high elasticity and good deformation in the bridge overlap test, without signs of rupture. In the inverted tube test, F10 showed slow flow, indicating an intermediate polymeric structure: network formation with some degree of stability, yet still susceptible to displacement over time. After 3D printing, F10 produced a consolidated printed structure immediately after extrusion. Drying evaluation of formulations F9 and F10 was performed in an incubator at 37 °C, with measurements every 20 minutes. Based on the equilibrium isotherm, 0.8% free moisture and 99.2% equilibrium moisture were observed, with F9 reaching equilibrium in 6 hours and F10 in 9 hours. Additionally, the calculated drying rate at each curve point demonstrated compliance with the parameters established for the determination of the isotherm. Despite similar isothermal behavior, F10 maintained better integrity of the polymeric network. It is concluded that the characterization allowed the identification of a stable formulation capable of maintaining adequate shape and consistency. The selected formulation is suitable for application in 3D printing technology and is promising for the development of a

chewable dosage form containing the active ingredient for ectoparasite control in cats.

Palavras-chave: feline; 3d printing; palatability.